

IN THE CLAIMS

Please amend the claims as follows:

Claims 1-4 (Canceled).

Claim 5 (Currently Amended) A method of generating an interpolation image comprising:

dividing a first image into a plurality of first blocks;

searching a second image for a second block having a ~~strong~~ correlation with respect to one of the first blocks every first block;

deriving a first motion vector between the first block and the second block;

extracting a first sub block and a second sub block from the first block, the first sub block including pixels that an absolute difference value is less than a threshold, the second sub block including pixels that the absolute difference value is not less than the threshold, the absolute difference value being an absolute difference value between opposite pixels of the first block and the second block;

searching for a third sub block in a region on the second image, the third sub block having a stronger ~~strong~~ correlation with respect to the second sub block than to the first sub block, said correlation being stronger than a predetermined condition, the region corresponding to a region that the absolute difference value is less than the threshold;

deriving a second motion vector between the second sub block and the third sub block; and

copying the first sub block and the second sub block onto a third image between the first image and the second image, using the first motion vector and the second motion vector,

wherein searching for the second block includes computing the absolute difference value between opposite pixels of each of a plurality of block candidates of the second image

and the first block every pixel, counting pixels that the absolute difference value is less than the threshold to obtain the number of pixels, and selecting as the second block one of the block candidates in a search range that the number of pixels is maximum,

wherein the absolute difference value is a first absolute difference value and the threshold is a first threshold, and searching for the third sub block includes

computing a second absolute difference value of opposite pixels between each of a plurality of sub block candidates of the second image and the second sub block every pixel,

counting pixels in the first region that the second absolute difference value is less than a second threshold to obtain the number of pixels,

counting pixels in the second region on the second image that the first absolute difference value is less than the first threshold and the second absolute difference value is less than second threshold to obtain the second number of pixels, and

selecting as the third sub block one of the second sub block candidates that sum of the number of pixels and the second number of pixels is maximum in a search range, and

wherein the second threshold is smaller than the first threshold.

Claim 6 (Currently Amended) A method of generating an interpolation image comprising:

dividing a first image into a plurality of first blocks;

searching a second image for a second block having a ~~strong~~ correlation with respect to one of the first blocks every first block;

deriving a first motion vector between the first block and the second block;

extracting a first sub block and a second sub block from the first block, the first sub block including pixels that an absolute difference value is less than a threshold, the second sub block including pixels that the absolute difference value is not less than the threshold, the absolute difference value being an absolute difference value between opposite pixels of the first block and the second block;

searching for a third sub block in a region on the second image, the third sub block having a stronger ~~strong~~ correlation with respect to the second sub block than to the first sub block, said correlation being stronger than a predetermined condition, the region corresponding to a region that the absolute difference value is less than the threshold;

deriving a second motion vector between the second sub block and the third sub block; and

copying the first sub block and the second sub block onto a third image between the first image and the second image, using the first motion vector and the second motion vector,

wherein searching for the second block includes computing the absolute difference value between opposite pixels of each of a plurality of block candidates of the second image and the first block every pixel, counting pixels that the absolute difference value is less than the threshold to obtain the number of pixels, and selecting as the second block one of the block candidates in a search range that the number of pixels is maximum,

wherein the absolute difference value is a first absolute difference value and the threshold is a first threshold, and searching for the third sub block includes

computing a second absolute difference value of opposite pixels between each of a plurality of sub block candidates of the second image and the second sub block every pixel,

counting pixels in the first region that the second absolute difference value is less than a second threshold to obtain the number of pixels,

counting pixels in the second region on the second image that the first absolute difference value is less than the first threshold and the second absolute difference value is less than second threshold to obtain the second number of pixels, and

selecting as the third sub block one of the second sub block candidates that sum of the number of pixels and the second number of pixels is maximum in a search range, and

~~wherein the second threshold is smaller than the first threshold, and~~

wherein the copying includes copying onto the third image the pixels of the first sub block, a first group of pixels in the first region that the second absolute difference value is less than the second threshold, and a second group of pixels in the second region on the second image that the first absolute difference value is less than the first threshold and the second absolute difference value is not less than the second threshold.

Claim 7 (Currently Amended) A method of generating an interpolation image comprising:

dividing a first image into a plurality of first blocks;

searching a second image for a second block having a ~~strong~~ correlation with respect to one of the first blocks every first block;

deriving a first motion vector between the first block and the second block;

extracting a first sub block and a second sub block from the first block, the first sub block including pixels that an absolute difference value is less than a threshold, the second sub block including pixels that the absolute difference value is not less than the threshold, the absolute difference value being an absolute difference value between opposite pixels of the first block and the second block;

searching for a third sub block in a region on the second image, the third sub block having a stronger ~~strong~~ correlation with respect to the second sub block than to the first sub block, said correlation being stronger than a predetermined condition, the region corresponding to a region that the absolute difference value is less than the threshold;

deriving a second motion vector between the second sub block and the third sub block; and

copying the first sub block and the second sub block onto a third image between the first image and the second image, using the first motion vector and the second motion vector,

wherein searching for the second block includes computing the absolute difference value between opposite pixels of each of a plurality of block candidates of the second image and the first block every pixel, counting pixels that the absolute difference value is less than the threshold to obtain the number of pixels, and selecting as the second block one of the block candidates in a search range that the number of pixels is maximum,

wherein the absolute difference value is a first absolute difference value and the threshold is a first threshold, and searching for the third sub block includes

computing a second absolute difference value of opposite pixels between each of a plurality of sub block candidates of the second image and the second sub block every pixel,

counting pixels in the first region that the second absolute difference value is less than a second threshold to obtain the number of pixels,

counting pixels in the second region on the second image that the first absolute difference value is less than the first threshold and the second absolute difference value is less than second threshold to obtain the second number of pixels, and

selecting as the third sub block one of the second sub block candidates that sum of the number of pixels and the second number of pixels is maximum in a search range, and

~~wherein the second threshold is smaller than the first threshold, and~~

wherein the copying includes copying onto the third image the pixels of the first sub block, a first group of pixels in the first region that the second absolute difference value is less than the second threshold, and a second group of pixels in the second region on the second image that the first absolute difference value is less than the first threshold and the second absolute difference value is not less than the second threshold, and

wherein the copying includes

obtaining a scale conversion factor by dividing a first time period between the third image and the second image by a second time period between the first image and the second image,

obtaining a third motion vector by multiplying the first motion vector by the scale transfer coefficient,

obtaining a fourth motion vector by multiplying the second motion vector by the scale transfer coefficient,

copying pixels of the first sub block onto the third image based on the third motion vector, and

copying, onto the third image, pixels belonging to the first group of pixels and the second group of pixels based on the fourth motion vector.

Claims 8-12 (Canceled).

Claim 13 (Currently Amended) A method of generating an interpolation image comprising:

dividing an interpolation image between a first image and a second image into a plurality of to-be-interpolated blocks;

searching for the first block of the first frame and the second block of the second frame, the first block and the second block being in alignment with the to-be-interpolated blocks and having a ~~strong~~ correlation to each other;

deriving a first motion vector between the first block and the second block;

extracting a first sub block and a second sub block from the first block, the first sub block including pixels that an absolute difference value between opposite pixels of the first block and the second block is less than a threshold, the second sub block including pixels that the absolute difference value is not less than the threshold;

extracting from each of the first image and the second image a region including pixels that the absolute difference value is not less than the threshold;

searching for a third sub block of the region of the first image and a fourth sub block of the region of the second image, the third sub block and the fourth sub block being in alignment with the to-be-interpolated blocks and having a stronger ~~strong~~ correlation with respect to each other than to either the first or second sub blocks, said correlation being stronger than a predetermined condition;

deriving a second motion vector between the third sub block and the fourth sub block;
and

copying the first sub block and the third sub block onto the interpolation image, using the first motion vector and the second motion vector, and

wherein searching for the third sub block and the fourth sub block includes

computing a second absolute difference value between opposite pixels of a third sub block candidate of the first image and a fourth sub block candidate of the second image every pixel,

counting pixels of pixel pairs that the second absolute difference value is less than the second threshold, with both of the pixels less than the threshold and the pixels not less than the threshold existing in the region, to obtain the first number of pixels,

counting pixels of pixel pairs that the second absolute difference value is less than the third threshold, with the pixels less than the threshold or the pixels not less than the threshold existing in the region, to obtain the second number of pixels,

counting pixels that the second absolute difference value is less than the fourth threshold, with no pixel less than or not less than the threshold existing in the region, to obtain the third number of pixels, and

selecting a sub block pair of the third sub block candidate and the fourth sub block candidate that a sum of the first number of pixels, the second number of pixels and the third number of pixels is maximum in a search range as the third sub block and the fourth sub block.

Claim 14 (Currently Amended) A method of generating an interpolation image comprising:

dividing an interpolation image between a first image and a second image into a plurality of to-be-interpolated blocks;

searching for the first block of the first frame and the second block of the second frame, the first block and the second block being in alignment with the to-be-interpolated blocks and having a ~~strong~~ correlation to each other;

deriving a first motion vector between the first block and the second block;

extracting a first sub block and a second sub block from the first block, the first sub block including pixels that an absolute difference value between opposite pixels of the first block and the second block is less than a threshold, the second sub block including pixels that the absolute difference value is not less than the threshold;

extracting from each of the first image and the second image a region including pixels that the absolute difference value is not less than the threshold;

searching for a third sub block of the region of the first image and a fourth sub block of the region of the second image, the third sub block and the fourth sub block being in alignment with the to-be-interpolated blocks and having a stronger strong correlation with respect to each other than to either the first or second sub blocks, said correlation being stronger than a predetermined condition;

deriving a second motion vector between the third sub block and the fourth sub block;
and

copying the first sub block and the third sub block onto the interpolation image, using the first motion vector and the second motion vector, and

wherein searching for the third sub block and the fourth sub block includes

computing a second absolute difference value between opposite pixels of a third sub block candidate of the first image and a fourth sub block candidate of the second image every pixel,

counting pixels of pixel pairs that the second absolute difference value is less than the second threshold, with both of the pixels less than the threshold and the pixels not less than the threshold existing in the region, to obtain the first number of pixels,

counting pixels of pixel pairs that the second absolute difference value is less than the third threshold, with the pixels less than the threshold or the pixels not less than the threshold existing in the region, to obtain the second number of pixels,

counting pixels that the second absolute difference value is less than the fourth threshold, with no pixel less than or not less than the threshold existing in the region, to obtain the third number of pixels, and

selecting a sub block pair of the third sub block candidate and the fourth sub block candidate that a sum of the first number of pixels, the second number of pixels and the third number of pixels is maximum in a search range as the third sub block and the fourth sub block, and

which includes selecting a region corresponding to the interpolation sub block in the third block as a third sub block, and selecting a region corresponding to the interpolation sub block in the fourth block as a fourth block.

Claims 15-20 (Canceled).

Claim 21 (New) An apparatus configured to generate an interpolation image comprising:

a divider configured to divide a first image into a plurality of first blocks;

a first searcher configured to search a second image for a second block having a ~~strong~~ correlation with respect to one of the first blocks every first block;

a first deriving mechanism configured to derive a first motion vector between the first block and the second block;

an extractor configured to extract a first sub block and a second sub block from the first block, the first sub block including pixels that an absolute difference value is less than a

threshold, the second sub block including pixels that the absolute difference value is not less than the threshold, the absolute difference value being an absolute difference value between opposite pixels of the first block and the second block;

a second searcher configured to search for a third sub block in a region on the second image, the third sub block having a stronger correlation with respect to the second sub block than to the first sub block, said correlation being stronger than a predetermined condition, the region corresponding to a region that the absolute difference value is less than the threshold;

a second deriving mechanism configured to derive a second motion vector between the second sub block and the third sub block; and

a copier configured to copy the first sub block and the second sub block onto a third image between the first image and the second image, using the first motion vector and the second motion vector,

wherein the first searcher is configured to

compute the absolute difference value between opposite pixels of each of a plurality of block candidates of the second image and the first block every pixel,

count pixels that the absolute difference value is less than the threshold to obtain the number of pixels, and

select as the second block one of the block candidates in a search range that the number of pixels is maximum,

wherein the absolute difference value is a first absolute difference value and the threshold is a first threshold, and the second searcher is configured to

compute a second absolute difference value of opposite pixels between each of a plurality of sub block candidates of the second image and the second sub block every pixel,

count pixels in the first region that the second absolute difference value is less than a second threshold to obtain the number of pixels,

count pixels in the second region on the second image that the first absolute difference value is less than the first threshold and the second absolute difference value is less than second threshold to obtain the second number of pixels, and

select as the third sub block one of the second sub block candidates that sum of the number of pixels and the second number of pixels is maximum in a search range, and

wherein the second threshold is smaller than the first threshold.

Claim 22 (New) An apparatus configured to generate an interpolation image comprising:

a divider configured to divide a first image into a plurality of first blocks;

a first searcher configured to search a second image for a second block having a strong correlation with respect to one of the first blocks every first block;

a first deriving mechanism configured to derive a first motion vector between the first block and the second block;

an extractor configured to extract a first sub block and a second sub block from the first block, the first sub block including pixels that an absolute difference value is less than a threshold, the second sub block including pixels that the absolute difference value is not less than the threshold, the absolute difference value being an absolute difference value between opposite pixels of the first block and the second block;

a second searcher configured to search for a third sub block in a region on the second image, the third sub block having a stronger correlation with respect to the second sub block

than to the first sub block, said correlation being stronger than a predetermined condition, the region corresponding to a region that the absolute difference value is less than the threshold;

a second deriving mechanism configured to derive a second motion vector between the second sub block and the third sub block; and

a copier configured to copy the first sub block and the second sub block onto a third image between the first image and the second image, using the first motion vector and the second motion vector,

wherein the first searcher is configured to

compute the absolute difference value between opposite pixels of each of a plurality of block candidates of the second image and the first block every pixel,

count pixels that the absolute difference value is less than the threshold to obtain the number of pixels, and

select as the second block one of the block candidates in a search range that the number of pixels is maximum,

wherein the absolute difference value is a first absolute difference value and the threshold is a first threshold, and the second searcher is configured to

compute a second absolute difference value of opposite pixels between each of a plurality of sub block candidates of the second image and the second sub block every pixel,

count pixels in the first region that the second absolute difference value is less than a second threshold to obtain the number of pixels,

count pixels in the second region on the second image that the first absolute difference value is less than the first threshold and the second absolute difference value is less than second threshold to obtain the second number of pixels, and

select as the third sub block one of the second sub block candidates that sum of the number of pixels and the second number of pixels is maximum in a search range, and

wherein the copier is configured to

copy onto the third image the pixels of the first sub block, a first group of pixels in the first region that the second absolute difference value is less than the second threshold, and a second group of pixels in the second region on the second image that the first absolute difference value is less than the first threshold and the second absolute difference value is not less than the second threshold.

Claim 23 (New) An apparatus configured to generate an interpolation image comprising:

a divider configured to divide a first image into a plurality of first blocks;

a first searcher configured to search a second image for a second block having a ~~strong~~ correlation with respect to one of the first blocks every first block;

a first deriving mechanism configured to derive a first motion vector between the first block and the second block;

an extractor configured to extract a first sub block and a second sub block from the first block, the first sub block including pixels that an absolute difference value is less than a threshold, the second sub block including pixels that the absolute difference value is not less than the threshold, the absolute difference value being an absolute difference value between opposite pixels of the first block and the second block;

a second searcher configured to search for a third sub block in a region on the second image, the third sub block having a stronger correlation with respect to the second sub block

than to the first sub block, said correlation being stronger than a predetermined condition, the region corresponding to a region that the absolute difference value is less than the threshold;

a second deriving mechanism configured to derive a second motion vector between the second sub block and the third sub block; and

a copier configured to copy the first sub block and the second sub block onto a third image between the first image and the second image, using the first motion vector and the second motion vector,

wherein the first searcher is configured to

compute the absolute difference value between opposite pixels of each of a plurality of block candidates of the second image and the first block every pixel,

count pixels that the absolute difference value is less than the threshold to obtain the number of pixels, and

select as the second block one of the block candidates in a search range that the number of pixels is maximum,

wherein the absolute difference value is a first absolute difference value and the threshold is a first threshold, and the second searcher is configured to

compute a second absolute difference value of opposite pixels between each of a plurality of sub block candidates of the second image and the second sub block every pixel,

count pixels in the first region that the second absolute difference value is less than a second threshold to obtain the number of pixels,

count pixels in the second region on the second image that the first absolute difference value is less than the first threshold and the second absolute difference value is less than second threshold to obtain the second number of pixels, and

select as the third sub block one of the second sub block candidates that sum of the number of pixels and the second number of pixels is maximum in a search range, and

wherein the copier is configured to

copy onto the third image the pixels of the first sub block, a first group of pixels in the first region that the second absolute difference value is less than the second threshold, and a second group of pixels in the second region on the second image that the first absolute difference value is less than the first threshold and the second absolute difference value is not less than the second threshold, and

wherein the copier is configured to

obtain a scale conversion factor by dividing a first time period between the third image and the second image by a second time period between the first image and the second image,

obtain a third motion vector by multiplying the first motion vector by the scale transfer coefficient,

obtain a fourth motion vector by multiplying the second motion vector by the scale transfer coefficient,

copy pixels of the first sub block onto the third image based on the third motion vector, and

copy, onto the third image, pixels belonging to the first group of pixels and the second group of pixels based on the fourth motion vector.

Claim 24 (New) An apparatus configured to generate an interpolation image comprising:

a divider configured to divide an interpolation image between a first image and a second image into a plurality of to-be-interpolated blocks;

a first searcher configured to search for the first block of the first frame and the second block of the second frame, the first block and the second block being in alignment with the to-be-interpolated blocks and having a ~~strong~~ correlation to each other;

a first deriving mechanism configured to derive a first motion vector between the first block and the second block;

a first extractor configured to extract a first sub block and a second sub block from the first block, the first sub block including pixels that an absolute difference value between opposite pixels of the first block and the second block is less than a threshold, the second sub block including pixels that the absolute difference value is not less than the threshold;

a second extractor configured to extract from each of the first image and the second image a region including pixels that the absolute difference value is not less than the threshold;

a second searcher configured to search for a third sub block of the region of the first image and a fourth sub block of the region of the second image, the third sub block and the fourth sub block being in alignment with the to-be-interpolated blocks and having a stronger correlation with respect to each other than to either the first or second sub blocks, said correlation being stronger than a predetermined condition;

a second deriving mechanism configured to derive a second motion vector between the third sub block and the fourth sub block; and

a copier configured to copy the first sub block and the third sub block onto the interpolation image, using the first motion vector and the second motion vector, and

wherein the second searcher is configured to

compute a second absolute difference value between opposite pixels of a third sub block candidate of the first image and a fourth sub block candidate of the second image every pixel,

count pixels of pixel pairs that the second absolute difference value is less than the second threshold, with both of the pixels less than the threshold and the pixels not less than the threshold existing in the region, to obtain the first number of pixels,

count pixels of pixel pairs that the second absolute difference value is less than the third threshold, with the pixels less than the threshold or the pixels not less than the threshold existing in the region, to obtain the second number of pixels,

count pixels that the second absolute difference value is less than the fourth threshold, with no pixel less than or not less than the threshold existing in the region, to obtain the third number of pixels, and

select a sub block pair of the third sub block candidate and the fourth sub block candidate that a sum of the first number of pixels, the second number of pixels and the third number of pixels is maximum in a search range as the third sub block and the fourth sub block.

Claim 25 (New) An apparatus configured to generate an interpolation image comprising:

a divider configured to divide an interpolation image between a first image and a second image into a plurality of to-be-interpolated blocks;

a first searcher configured to search for the first block of the first frame and the second block of the second frame, the first block and the second block being in alignment with the to-be-interpolated blocks and having a ~~strong~~ correlation to each other;

a first deriving mechanism configured to derive a first motion vector between the first block and the second block;

a first extractor configured to extract a first sub block and a second sub block from the first block, the first sub block including pixels that an absolute difference value between opposite pixels of the first block and the second block is less than a threshold, the second sub block including pixels that the absolute difference value is not less than the threshold;

a second extractor configured to extract from each of the first image and the second image a region including pixels that the absolute difference value is not less than the threshold;

a second searcher configured to search for a third sub block of the region of the first image and a fourth sub block of the region of the second image, the third sub block and the fourth sub block being in alignment with the to-be-interpolated blocks and having a stronger correlation with respect to each other than to either the first or second sub blocks, said correlation being stronger than a predetermined condition;

a second deriving mechanism configured to derive a second motion vector between the third sub block and the fourth sub block; and

a copier configured to copy the first sub block and the third sub block onto the interpolation image, using the first motion vector and the second motion vector, and

wherein the second searcher is configured to

compute a second absolute difference value between opposite pixels of a third sub block candidate of the first image and a fourth sub block candidate of the second image every pixel,

count pixels of pixel pairs that the second absolute difference value is less than the second threshold, with both of the pixels less than the threshold and the pixels not less than the threshold existing in the region, to obtain the first number of pixels,

count pixels of pixel pairs that the second absolute difference value is less than the third threshold, with the pixels less than the threshold or the pixels not less than the threshold existing in the region, to obtain the second number of pixels,

count pixels that the second absolute difference value is less than the fourth threshold, with no pixel less than or not less than the threshold existing in the region, to obtain the third number of pixels, and

select a sub block pair of the third sub block candidate and the fourth sub block candidate that a sum of the first number of pixels, the second number of pixels and the third number of pixels is maximum in a search range as the third sub block and the fourth sub block, and

select a region corresponding to the interpolation sub block in the third block as a third sub block, and

select a region corresponding to the interpolation sub block in the fourth block as a fourth block.